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Description of an invention
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[(Patent Application.)]

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Applicant: Krym medical institute.

Inventors: Bezrukov, S.G., and [Ms.] Morozova, M.N.

Prior art documents to be taken into account: US 3534740, 1970, Classification A16B 17/06.

Title: Surgical suture material.

Abstract: Area of technology of applicability: Plastic surgery. Essence of the invention: The ligature is comprised of two sequentially joined sutures of different types, comprised of, e.g., polymer and metal (respectively), wherewith the metallic part has (linear) segments which have different diameters. 3 Figures.

[Specification]:

The invention relates to the area of technology of medicine, in particular to surgical suture materials, with particular applicability in plastic surgery.

A surgical suture material is known which is in the form of a wire suture according to Spechtenhauser (so-called "Viennese wire"), comprised of aluminum bronze material.

Some drawbacks of the known suture material are: the high level of traumatic effects on tissues, the limitation of use of the material for implantation of single looped sutures, and the associated low cosmetic qualities of he suture.

The known suture material which is closest to the proposed material is an atraumatic suture material in the form of a ligature which is joined to a needle.

Some drawbacks of this suture material under conditions of emplacement of intradermal sutures are: the need to pierce the skin near the ends of the wound, in order to fix the ends of the suture with knots; shortening of the length of the wound, with the possibility of deformation of the tissues; and insufficient hermetization of the suture in its central region [sic]. These drawbacks are connected with the fact that

the surgical suture material used does not have sufficient resiliency and elasticity.

An object of the invention was to devise means of reducing the traumatic effects of the suture and increasing the cosmetic qualities, in particular by means of uniform compression of the edges of the wound.

This object is achieved in that, in a surgical suture material, in the form of a combination of a ligature and needle, the ligature is comprised of two sequentially joined sutures of different types, e.g. polymer and metal (respectively), wherewith the polymer ligature is joined to the needle, and the metallic ligature has regions of augmented cross sectional diameter, with said diameter being at the minimum value at the locus where it joins to the polymer ligature.

Fig. 1 shows an overall view of the surgical suture material;

Fig. 2 shows the first stage of suturing of a wound; and

Fig. 2 shows an overall view of the wound after emplacement of the suture.

The surgical suture material is comprised of a needle 1, a polymeric suture segment 2, and metallic suture segments (3, 4, 5), wherewith the cross sectional diameter gradually increases.

The material is utilized by stepwise deposition of the continuous suture into the tissue, such the ends of the suture coincide with the ends of the wound. For this, the first insertion of the needle into the skin is performed near one of the ends 6 of the wound 7. The needle is advanced in the tissues along the skin for a distance of 0.5-0.6 cm and is then caused to emerge into the gap of the wound. In the next insertion process, the needle is inserted into the skin of the opposite surface of the wound 7 at a point symmetrically opposite to the point of exit of the needle from the tissue. The needle is now advanced in the tissues along the skin for a distance of 0.5-0.6 cm and is then caused to emerge into the gap of the wound. At the opposite end of the wound, the suture 2 has an exit point, and is pulled tight. In this process, the edges of the wound come to be pulled together (wound comes to be closed), and the metallic ligature 3 comes to be implanted in the tissues, in the wound channel generated by the needle itself. After the wound channel has been filled by the wire suture 3 of low diameter, the surgeon decides (determines) whether there is still a diastasis [sic] of the wound 7, and whether the edges of the wound are sufficiently compressed together. If the surgeon is not satisfied with the quality of the suturing, he may subsequently carry out an additional step of tightening (applying additional tension to) the suture 3 with the aim of bringing about the implantation of a ligature of greater suture diameter 4 into the tissue. After achievement of a positive result, the excess metallic suture material is cut off, leaving it extending by 1 cm out of the surface of the skin. The end segments of the wire are bent and formed into ring shapes 8.

As components for fabrication of the suture sets, one may employ: a surgical needle to which the suture material is fixed by introducing the suture material into a channel in the needle, with subsequent compression (crimping). The joining of the polymeric suture segment to the metallic suture segment (which latter may be comprised of, e.g., stainless steel) may also be accomplished by compression (crimping) of the metal. The metal ligature with gradually increasing diameter may be fabricated, e.g., by butt-welding of segments of wire.

Example: Patient K., age 27 (i.b. [(unknown abbreviation)] No. 113, 1988), was admitted Feb 08, 1998 in the department of maxillofacial surgery of the Krym regional hospital named for N.A. Semashko, by reason of a contusion wound of the right cheekbone area, of dimensions 4.5 x 1.0 x 0.5 cm. Under infiltration anesthesia with a 0.5% Novocain solution (8 mL),

the wound was antiseptically prepared using a solution of furacillin (1:5000) and 3% hydrogen peroxide. The suture material used for suturing the wound was a combination comprised of atraumatic suture material and a metallic ligature of diameter 0.1 and 0.2 mm. Two layers [sic] of sutures were implanted -- one in the subcutaneous cellular tissue, and one in the skin. A generally accepted technique was used, with the only difference being that the ends of the suture had their exit points outward at the apices of the wound, without puncturing the skin. The subdermal cellular tissue was fixed (sutured) with the metal suture material of diameter 0.2 mm, whereas the suture material implanted in the skin was a metal ligature of diameter 0.1 mm. To prevent the suture from slipping out of the wound, its ends were each bent around in the form of a ring. Healing proceeded for 5 days, after which the sutures were removed. No complications were observed which might be attributable to the special surgical suture material.

The use of the proposed suture sets does not require penetration of the skin, or tying of knots. Due to the diameter and resilience (or elasticity) of the suture, the edges of the wound are sufficiently compressed; and the compression of the tissues can be regulated depending on the force of closing of the edges of the wound [sic -- circular]. By virtue of exerting a uniformly distributed pressure on the tissues, the metallic suture enables adequate fixation of the edges of the wound over the entire extent of the wound. The combination of these (features) reduces traumatic effects and enhances the cosmetic qualities of the suture.

Patent claim:

A surgical suture material, in the form of a combination of a ligature and needle; characterized in that, with the aim of reducing the traumatic effects and improving the cosmetic qualities of the suturing, in particular by providing a more uniform compression of the edges of the wound, the ligature is comprised of two sequentially joined sutures of different types, comprised of polymer and metal (respectively), wherewith the polymer ligature is joined to the needle, and the metallic ligature has regions of augmented cross sectional diameter, with said diameter being at the minimum value at the locus where the metallic ligature joins to the polymer ligature.

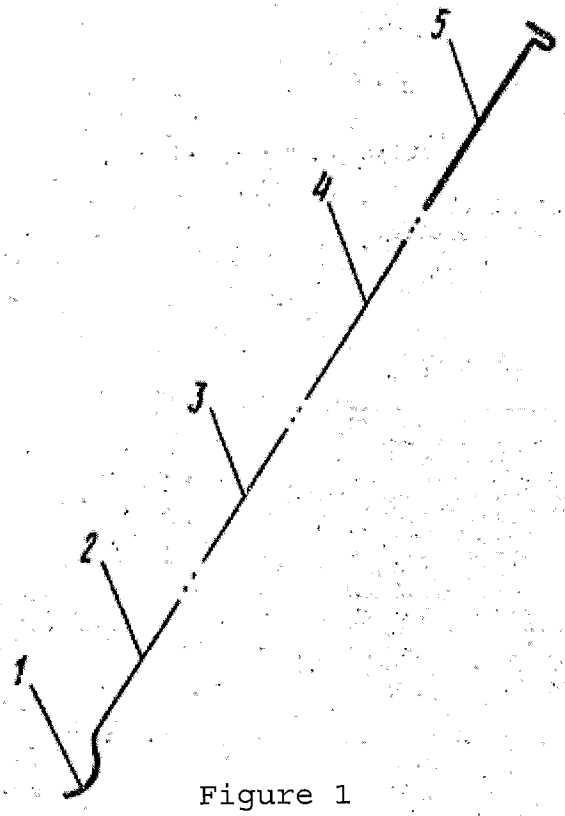

Figure 1

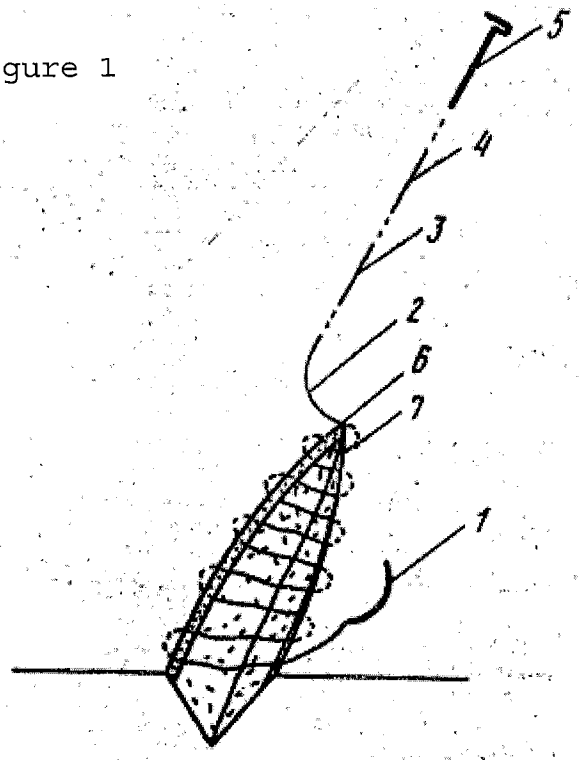

Figure 2

Translator's footnotes to translation of USSR patent application SU 1752358 A1, from Russian to English:
(Numbers at left are the sequential footnote number followed by the Russian column page number followed by a section number (a to f). E.g., "3:2c." signifies footnote 3, relating to Russian Col. 2, namely section c of an imaginary six sections in Russian Col. 2.)

1:(Abstract). The ligature is comprised of two sequentially joined sutures of different types, comprised of, e.g., polymer and metal [, respectively], wherewith the metallic part has (linear) segments which have different diameters.

2:1c. Some drawbacks of this suture material under conditions of emplacement of intradermal sutures are: the need to pierce the skin near the ends of the wound [being sutured], in order to fix the ends of the suture with knots; shortening of the length of the wound, with the possibility of deformation of the tissues; and insufficient hermetization of the suture in its central region [(sic -- the meaning of this is not obvious)].

3:2b. This object is achieved in that, in a surgical suture material [(suture set)], in the form of a combination of a ligature and needle, the ligature is comprised of two sequentially joined sutures of different types, e.g. polymer and metal [, respectively], wherewith the polymer ligature is joined to the needle, and the metallic ligature has regions of augmented cross sectional diameter, with said diameter being at the minimum value at the locus where it joins to the polymer ligature.

Fig. 1 shows an overall view of the surgical suture material [(suture set comprised of the inventive suture material joined to a suture needle)].

4:2f. The [inventive] surgical suture material [(suture set)] is comprised of a needle 1, a polymeric suture segment 2, and metallic suture segments (3, 4, 5), wherewith the cross sectional diameter [of the ensemble] gradually increases.

5:3a. The material [(suture set)] is utilized by stepwise deposition of the continuous suture into the tissue, such the ends of the suture coincide with the ends of the wound. For this, the first insertion of the needle into the skin is performed near one of the ends 6 of the wound 7. The needle is advanced in the tissues along [(generally in the plane of)] the skin for a distance of 0.5-0.6 cm and is then caused to emerge into the gap of the wound. In the next insertion process, the needle is inserted into the skin of the opposite [transverse] surface of the wound 7 [(viz. the opposite surface of the wound gap)] at a point symmetrically opposite to the [(abovementioned)] point of exit of the needle from the tissue. The needle is now advanced in the tissues along [(generally in the plane of)] the skin for a distance of 0.5-0.6 cm and is then caused to emerge into the gap of the wound. [Eventually,] at the opposite end of the wound, the suture 2 has an exit point, and is pulled tight. In this process, the edges of the wound come to be pulled together (wound comes to be closed), and the metallic ligature 3 comes to be implanted in the tissues, in the wound channel generated by the needle itself. After the wound channel [(of the needle)] has been [thus] filled by the [metallic] wire suture 3 of low diameter, the surgeon decides (determines) whether there is still a diastasis [(an unsatisfactory diastasis)] of the wound 7, and whether the edges of the wound are sufficiently compressed together. If the surgeon is not satisfied with the quality of the suturing, he may subsequently carry out an additional step of tightening (applying additional tension to) the suture 3 with the aim of bringing about the implantation of a ligature of greater suture diameter 4 into the [same] tissue. After [eventual] achievement of a positive result, the excess metallic suture material is cut off, leaving it [(end segments of it)] extending by 1 cm out of the surface of the skin. The end segments of the wire are [then] bent and formed into ring shapes 8.

6:4a. The suture material used for suturing the wound was a combination comprised of atraumatic [(well tolerated)] suture material and a metallic ligature of diameter 0.1 and 0.2 mm [, according to the invention]. Two layers [sic] of sutures were implanted -- one in the subcutaneous cellular tissue, and one in the skin. A generally accepted technique was used, with the only difference being that the ends of the suture had their exit points outward [(in or below the plane of the dermis?)] at the apices of the wound, without puncturing the skin [sic -- i.e. evidently subdermally]. The subdermal cellular tissue was fixed (sutured) with the metal suture material of diameter 0.2 mm, whereas the suture material implanted in the skin [(dermis)] was a metal ligature of diameter 0.1 mm.

7:4c. The use of the proposed suture sets does not require penetration of the skin [surface] [by the suture], or tying of knots. Due to the diameter and resilience (or elasticity) of the suture, the edges of the wound are sufficiently compressed; and the compression of the tissues can be regulated depending on the force of closing of the edges of the wound [sic -- evidently should be "depending on the localized tension in the suture"]. By virtue of exerting a [more] uniformly distributed pressure on the tissues, the metallic suture enables adequate fixation of the edges of the wound over the entire extent of the wound. The combination of these [features] reduces traumatic effects and enhances the cosmetic qualities of the suture.

8:4e. A surgical suture material [(suture set)], in the form of a combination of a ligature and needle; characterized in that, with the aim of reducing the traumatic effects and improving the cosmetic qualities of the suturing, in particular by providing a more uniform compression of the edges of the wound, the ligature is comprised of two sequentially joined sutures of different types, comprised of polymer and metal [, respectively], wherewith the polymer ligature is joined to the needle, and the metallic ligature has regions of augmented cross sectional diameter, with said diameter being at the minimum value at the locus where the metallic ligature joins to the polymer ligature.

СОЮЗ СОВЕТСКИХ СОЦИАЛИСТИЧЕСКИХ РЕСПУБЛИК

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(51)5 A 61 B 17/06

ГОСУДАРСТВЕННЫЙ КОМИТЕТ ПО ИЗОБРЕТЕНИЯМ И ОТКРЫТИЯМ ПРИ ГКНТ СССР

ОПИСАНИЕ ИЗОБРЕТЕНИЯ

К АВТОРСКОМУ СВИДЕТЕЛЬСТВУ

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(22) 29.06.90
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(54) ХИРУРГИЧЕСКИЙ ШОВНЫЙ МАТЕРИАЛ

(57) Использование: в пластической хирургии. Сущность изобретения: лигатура выполнена из двух последовательно соединенных разнородных нитей, выполненных, например, из металла и полимера, причем металлическая нить имеет участки с разными диаметрами. 3 ил.

Изобретение относится к медицине, а именно к хирургическим шовным материалам, и может использоваться в пластической хирургии.

Известен хирургический шовный материал в виде проволочной нити по Spechtenhauser'у (венская проволока), изготовленный из алюминиевой бронзы.

Недостатки известного материала – повышенная травматичность тканей, возможность его использования только для наложения одиночных узловатых швов и, в связи с этим, низкая косметическая ценность шва.

Наиболее близким к предлагаемому является атравматический шовный материал в виде соединенной с иглой лигатуры.

Недостатками такого шовного материала в условиях наложения непрерывного внутрикожного шва являются необходимость прокалывания кожи вблизи концов раны для фиксации концов нити узлами, укорочение раны по длине с возможностью возникновения деформаций тканей, отсутствие достаточного герметизма шва в центральном участке. Эти недостатки связаны с тем, что используемый в хирургии шовный материал не обладает необходимой упругостью.

Целью изобретения является снижение травматичности шва и повышение его косметичности путем обеспечения равномерной компрессии краев раны.

Поставленная цель достигается тем, что в хирургическом шовном материале, содержащем иглу и нить, лигатура представляет собой сочетание двух последовательно соединенных разнородных нитей, выполненных, например, из металла и полимера, при этом из полимера выполнена нить, соединенная с иглой, а металлическая нить имеет участки с увеличивающимся диаметром поперечного сечения, при этом диаметр поперечного сечения участка, соединенного с полимерной нитью, выполнен наименьшим.

На фиг.1 показан хирургический шовный материал, общий вид; на фиг.2 – первый этап сшивания раны; на фиг.3 – общий вид раны после наложения шва.

Хирургический шовный материал состоит из иглы 1, полимерной нити 2, металлических нитей 3–5 с постепенно увеличивающимся диаметром поперечного сечения.

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Используют материал путем послойного наложения на ткани непрерывного шва с выводом концов нити у концов раны. Для этого первый вкол иглы 1 осуществляют в дерму вблизи одного из концов 6 раны 7. Иглу проводят в тканях вдоль кожи на протяжении 0,5–0,6 см и вновь выводят в просвет раны. Следующий вкол осуществляют в дерму противоположной плоскости раны 7 симметрично точке выхода иглы из тканей. Иглу проводят в тканях на протяжении 0,5–0,6 см вдоль кожи и выводят в просвет раны. У противоположного конца раны нить 2 выводят и подтягивают. При этом края раны сближаются, по созданному иглой раневому каналу происходит внедрение в ткани металлической лигатуры 3. После заполнения раневого канала проволочной нитью 3 малого диаметра хирург определяет, сохранится ли диастаз раны 7 и достаточно ли компрессия ее краев. Если качество шва не удовлетворяет хирурга, он осуществляет следующий этап подтягивания нити 3 с целью внедрения в ткани лигатуры большего диаметра поперечного сечения нити 4. После достижения положительного результата избытки металлической нити отсекают, отступя от поверхности кожи 1 см. Концы проволоки изгибают и придают им форму кольца 8.

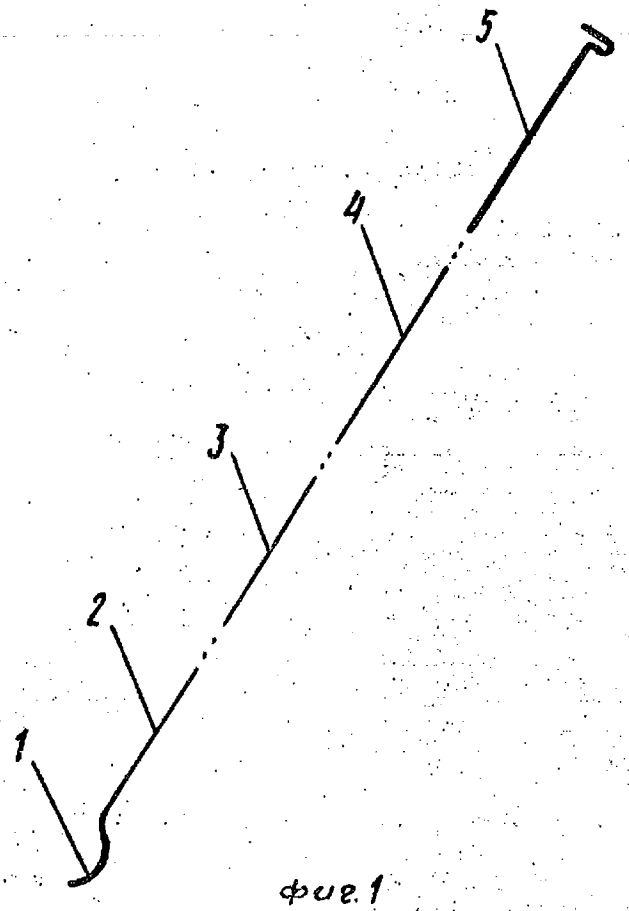
Для изготовления шовного материала могут быть использованы иглы хирургические, фиксирующие нить путем ее внедрения в канал иглы с последующим обжимом. Соединение полимерной нити с металлической, например, из нержавеющей стали также может быть осуществлено путем обжима металлом. Изготовление металлической лигатуры с постепенно увеличивающимся диаметром сечения может быть осуществлено, например, путем сварки отрезков проволоки встык.

Пример. Больной К., 27 лет (и.б. № 113, 1988), поступил 08.02.88 г. в отделение челюстно-лицевой хирургии Крымской областной больницы им. Н.А.Семашко по поводу ушибленной раны правой скуловой области. Размеры раны 4,5х1,0х0,5 см. Под инфильтрационной анестезией раствором новокаина (0,5%-ный) 8 мл проведена антисептическая обработка раны раствором фурацилина 1:5000 с 3%-ной перекисью водорода. Для сшивания раны использован комбинированный атравматический шовный материал с металлической лигатурой диаметром сечения 0,1 и 0,2 мм. Наложены непрерывные швы в два слоя: на подкожную клетчатку и на кожу. Использована общепринятая методика с той лишь разницей, что концы нити выведены наружу в углах раны без прокалывания кожи. Подкожная клетчатка фиксирована металлической нитью диаметром сечения 0,2 мм, на кожу наложен шов металлической лигатурой диаметром 0,1 мм. Для предотвращения выскальзывания нити из раны, ее концы загнули в виде колец. Заживление длилось 5 сут, после чего нити удалили. Осложнений, вызванных применением разработанного хирургического шовного материала, не наблюдали.

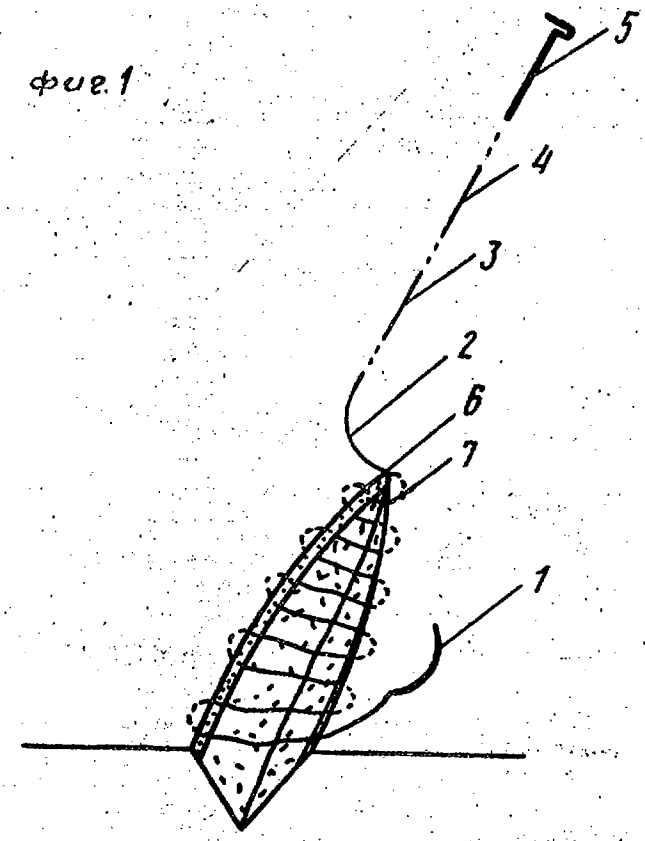
Использование предлагаемого шовного материала не требует прокалывания кожи и завязывания узлов. Диаметр и упругость нити обеспечивают достаточную компрессию краев раны, причем в зависимости от силы натяжения краев раны компрессию тканей можно регулировать. Металлическая нить равномерным распределением давления на ткани способствует адекватной фиксации краев раны на всем ее протяжении. Все это в совокупности снижает травматичность и повышает косметичность шва.

Формула изобретения

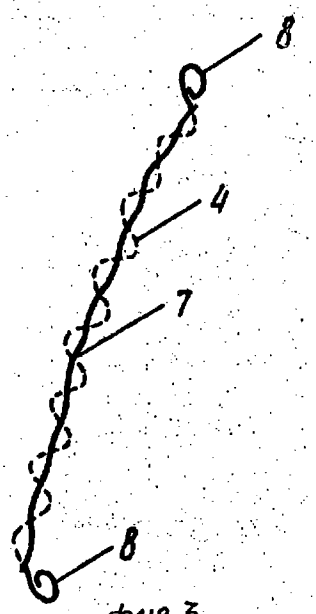
Хирургический шовный материал в виде соединенной с иглой лигатуры, отличающийся тем, что, с целью повышения косметичности шва и снижения его травматичности путем обеспечения равномерной компрессии краев раны, лигатура выполнена из двух последовательно соединенных разнородных нитей, выполненных из металла и полимера, при этом из полимера выполнена нить, соединенная с иглой, а металлическая нить имеет участки с увеличивающимся диаметром поперечного сечения, причем диаметр поперечного сечения участка, соединенного с полимерной нитью, выполнен наименьшим.



Фиг.1



Фиг.2



Фиг. 3

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